5XTC0: Using the NanoVNA

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Topics

- **How to calibrate your NanoVNA?**
- Changing your plot display
- Using NanoVNASaver
- Common bugs when using the NanoVNA

How to calibrate the NanoVNA?

Calibration standards

Load

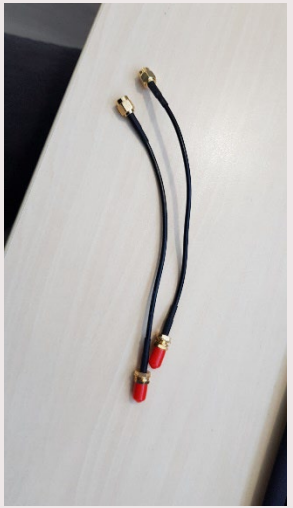
Thru

Short

Open

How to calibrate the NanoVNA

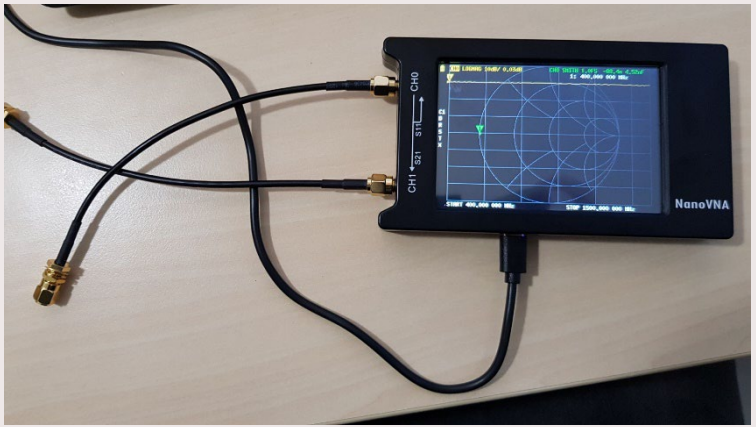
Connect your SMA cables



Please take care of the connectors and the device!

Only rotate the outer ring of the connector, not the cable itself because you can damage the connectors!

You can do this by holding the cable still and rotate the outer ring

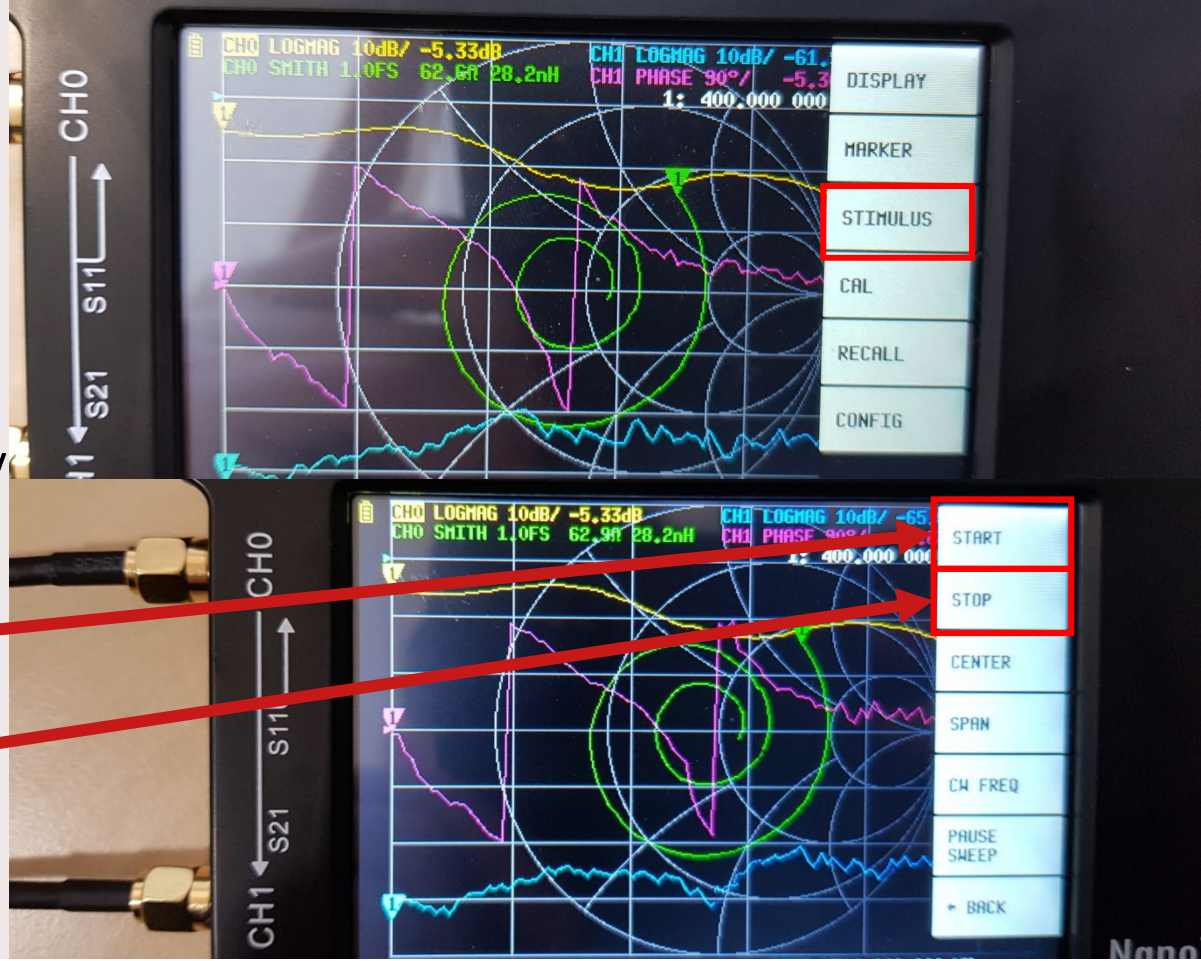


How to calibrate the NanoVNA

Set the frequency range of interest

In this example set the frequency range from 400-1500 MHz

Start frequency
Stimulus→Start→*400M*
Stop frequency
Stimulus→Stop→*1500M*



How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

1. Reset previous calibration

Cal→Reset

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

2. Calibrate with standards

Cal→Calibrate

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

3. Calibrate with standards
Connect the OPEN standard to the SMA cable on port CH0
Cal→Calibrate→Open

Note: the standard should now be highlighted in black (not visible in figure)

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

4. Calibrate with standards
Connect the SHORT standard to the SMA cable on port CH0
Cal→Calibrate→Short

Note: the standard should now be highlighted in black (not visible in figure)

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

5. Calibrate with standards
Connect the LOAD standard to the SMA cable on port CH0
Cal→Calibrate→Load

Note: the standard should now be highlighted in black (not visible in figure)

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

6. Calibrate with standards
Connect the LOAD standard to the SMA cable on port CH1
Cal→Calibrate→ISOLN

Note: the standard should now be highlighted in black (not visible in figure)

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

7. Calibrate with standards
Connect the THRU standard to the SMA cables on port CH0 and CH0
Cal→Calibrate→THRU

Note: the standard should now be highlighted in black (not visible in figure)

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

8. Calibration performed

Cal→Calibrate→DONE

Note: mind the black highlighted calibration steps

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

9. Save calibration data to be recalled

Cal→Save→SAVE X (where X can be any number from 1 to 4). Recommend you to save your calibration to SAVE1

Note: after calibration, data is automatically loaded and saved in SAVE0

How to calibrate the NanoVNA

Performing calibration

Go through all calibration steps in order to calibrate for all error terms!

10. Recall calibration data

Recall→Recall X (where X can be any number from 1 to 4). When saved to SAVE 1 you can select RECALL 1

Note: after calibration, data is automatically loaded and saved in SAVE0

How to calibrate the NanoVNA

How can you verify that your calibration is correct?

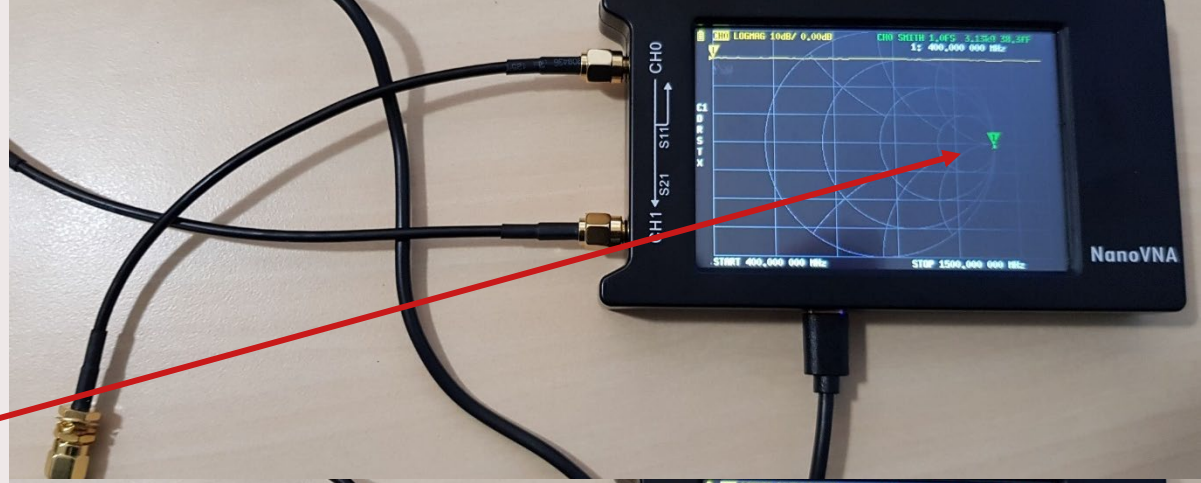
Connect your short/open/load standards and look at the smith chart.

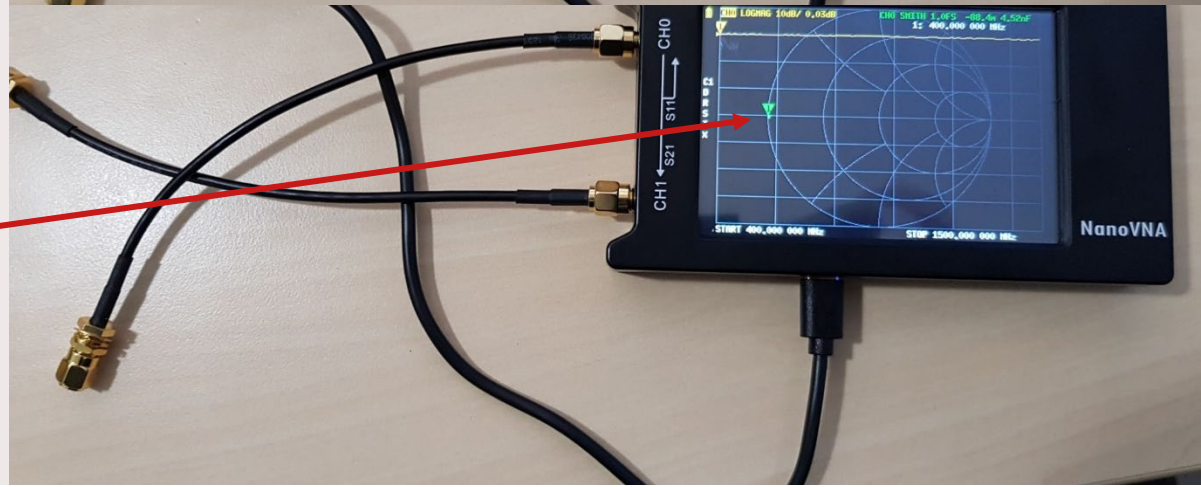
Open

Note: Also look at your LOG/MAG plot, this should be $S_{11} \approx 0\ dB$

Short

Note: Also look at your LOG/MAG plot, this should be $S_{11} \approx 0\ dB$





Topics

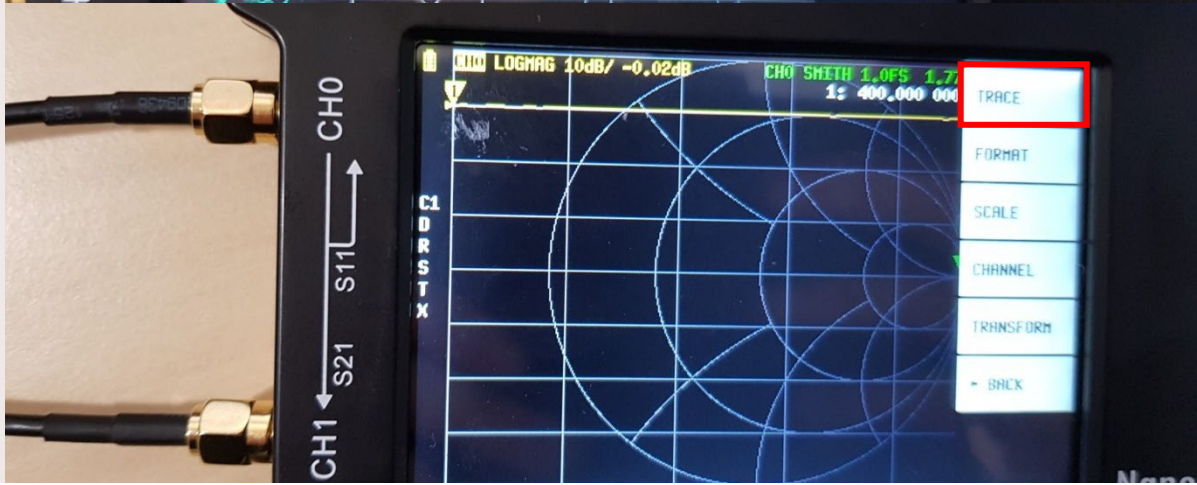
- How to calibrate your NanoVNA?
- **Changing your plot display**
- Using NanoVNASaver
- Common bugs when using the NanoVNA

Changing your plot display

How can you change the traces and display on your nanoVNA?

Adding/Removing traces

Display→Trace

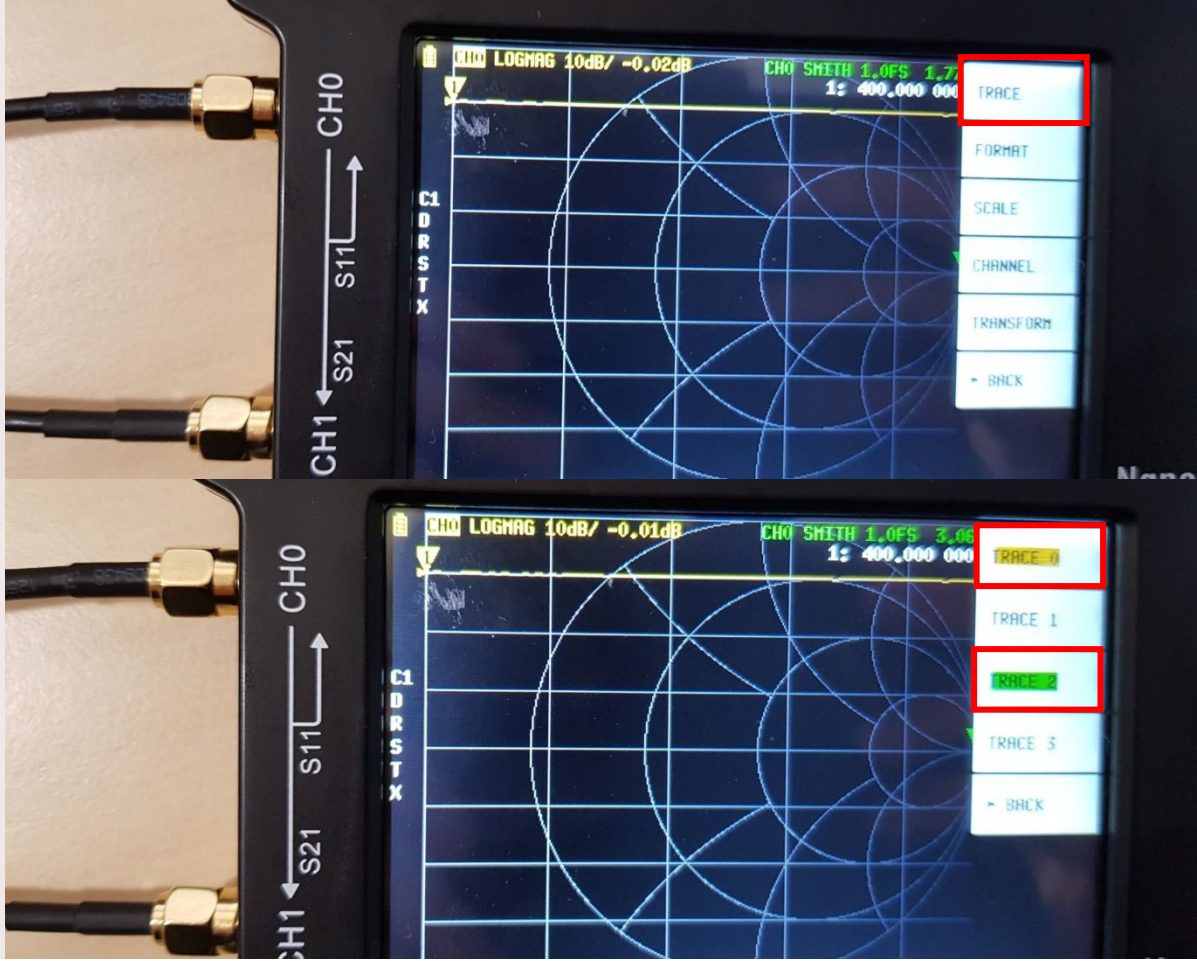


Changing your plot display

How can you change the traces and display on your nanoVNA?

Adding/Removing traces

Display→Trace→TRACE X
(X can be a number between 0 and 3)
Note: you can hide/view a trace when selecting it. When highlighted the trace is shown



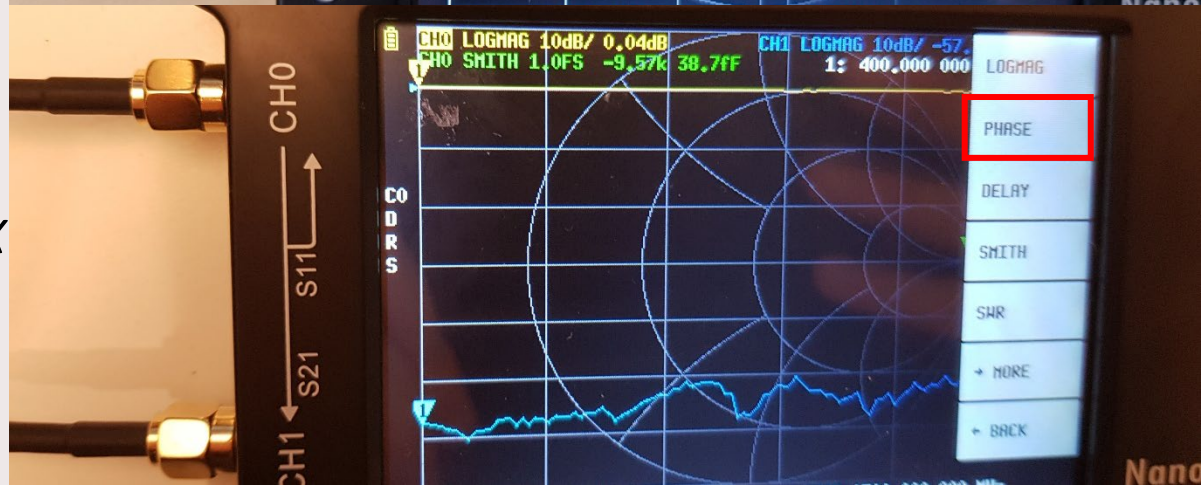
Changing your plot display

How to change the plot display?

Change TRACE 0 to PHASE

Display→Trace→TRACE 0
→BACK→FORMAT→PHASE

Note: you can change any trace X by any plot type (LOGMAG/SMITH) by reproducing these steps!



Topics

- How to calibrate your NanoVNA?
- Changing your plot display
- **Using NanoVNASaver**
- Common bugs when using the NanoVNA

Using NanoVNASaver

Connect your device

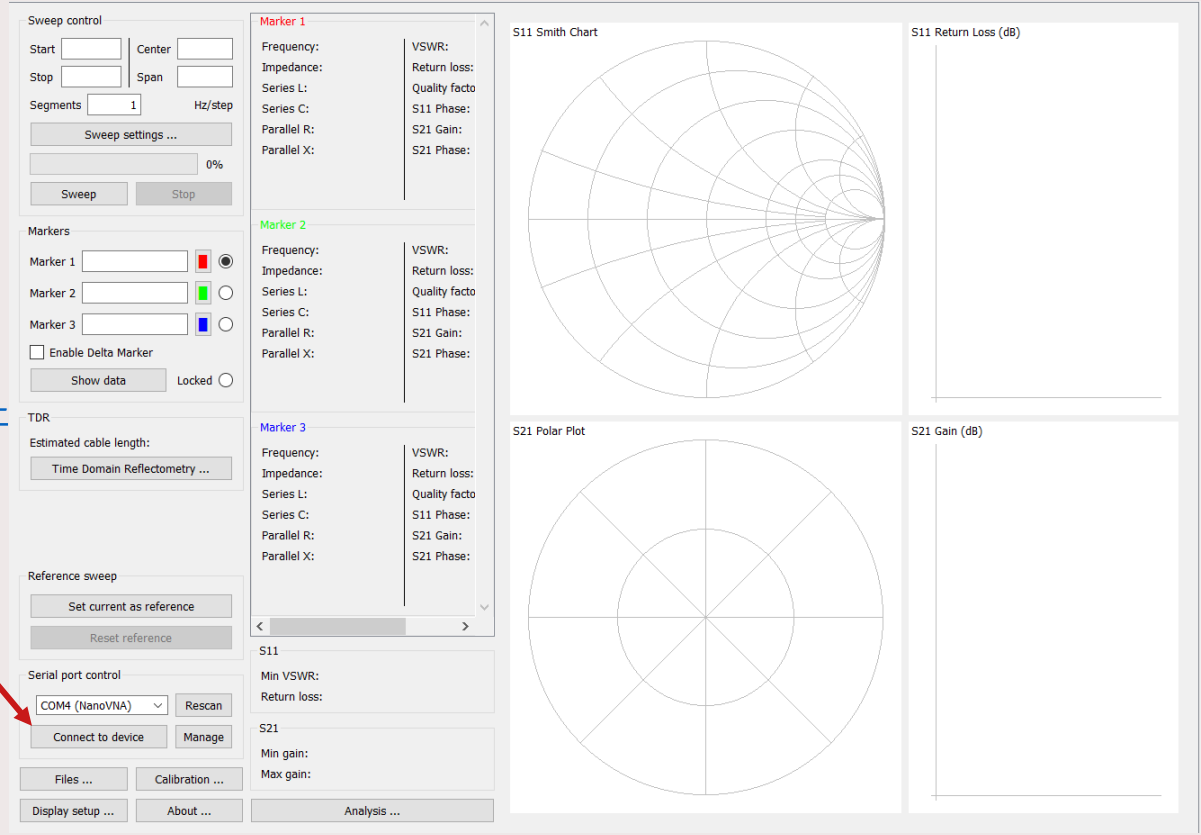
Download NanoVNASaver application from CANVAS and open the application.

Note: you can also get the application from https://github.com/NanoVNA-Saver/nanovna-saver/releases/tag/v0.3.10

Select the *Connected to device* button in NanoVNASaver

Note: make sure the NanoVNA is connected to your pc when opening NanoVNASaver

Note: When connecting, the data that is currently loaded in the NanoVNA will be loaded in NanoVNASaver as well.

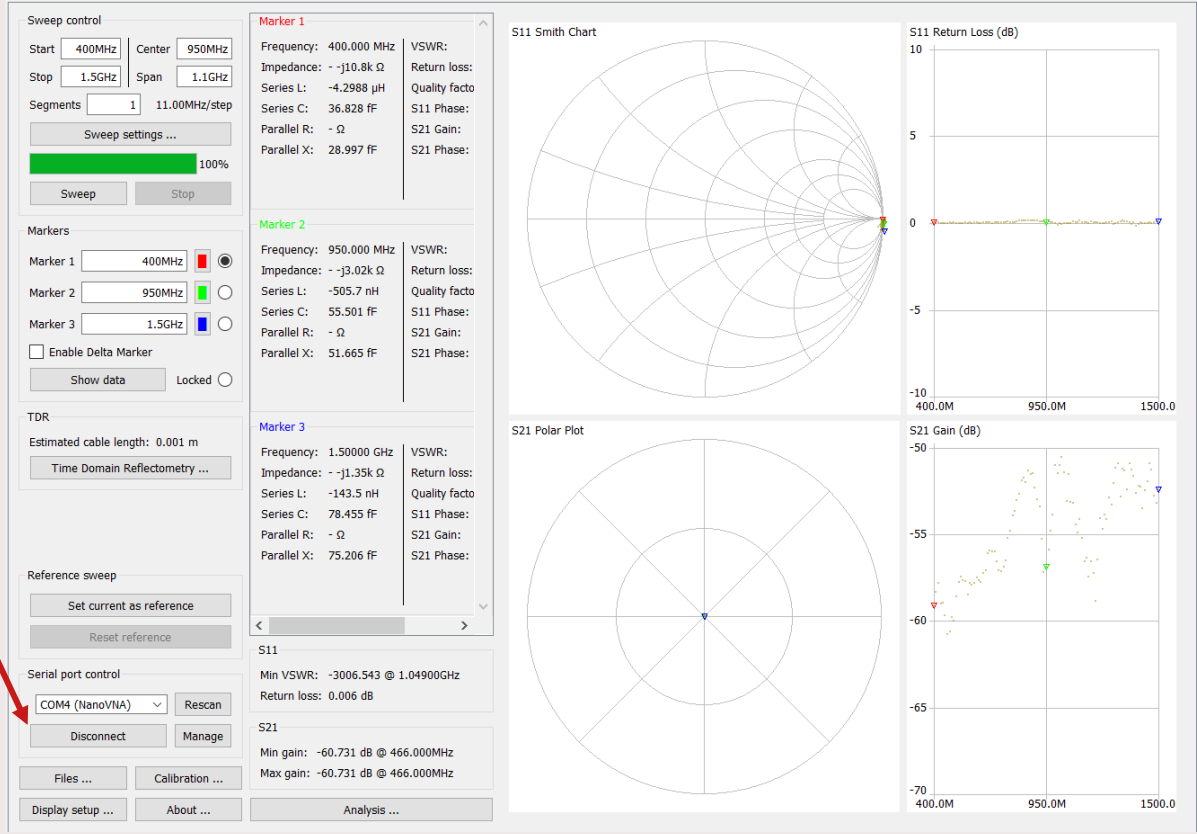


Using NanoVNASaver

Connect your device

When your device is connected successfully, it will show the box *Disconnected*

Note: color markers show the LOG/MAG and SMITH data at that particular frequency

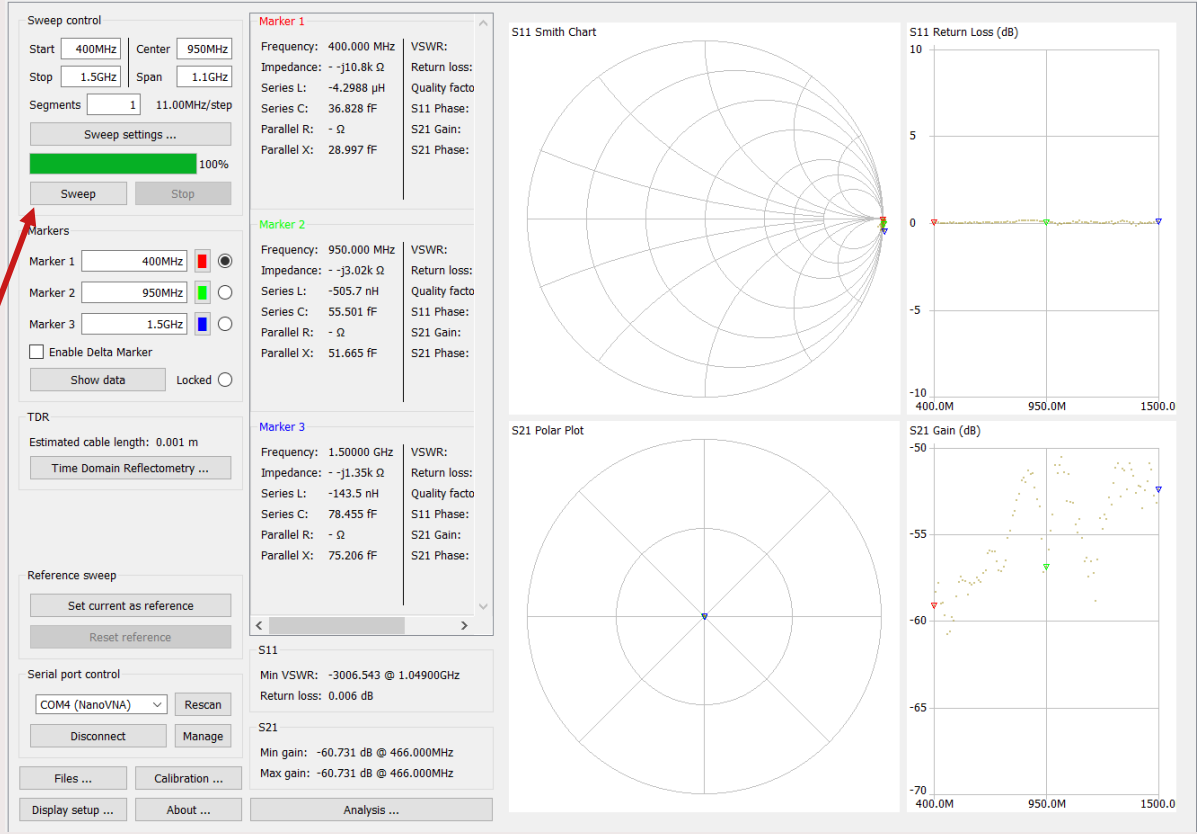


Using NanoVNASaver

Performing another measurement

Connect another component to the NanoVNA

Data can again be viewed in NanoVNASaver by using *Sweep*

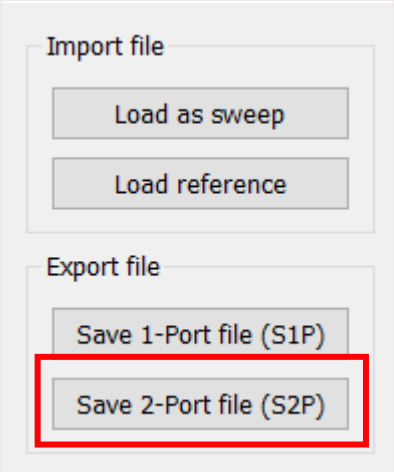


Using NanoVNASaver

Exporting data to Touchstone

Go to *Files…*

Your file can be exported to 1-port or 2-port network

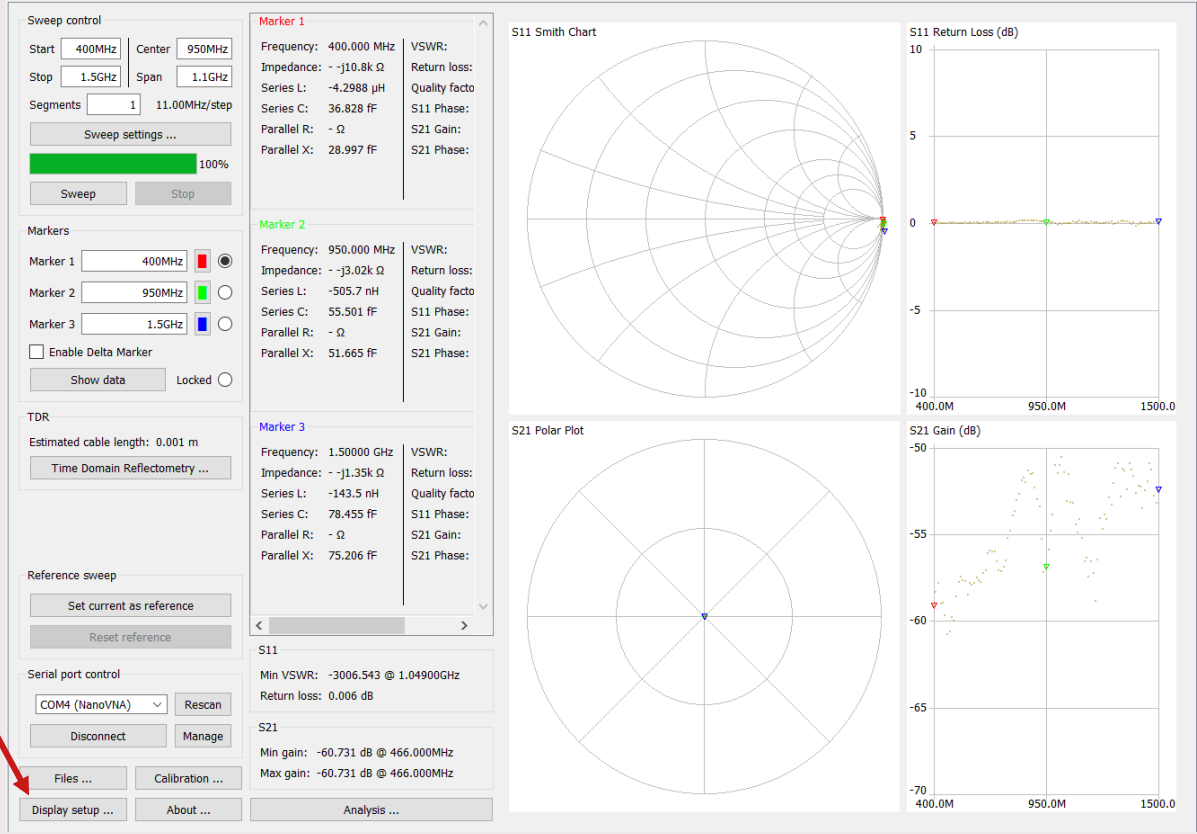


Using NanoVNASaver

How to change the plot display?

Go to *Display setup…*

A new window will pop-up



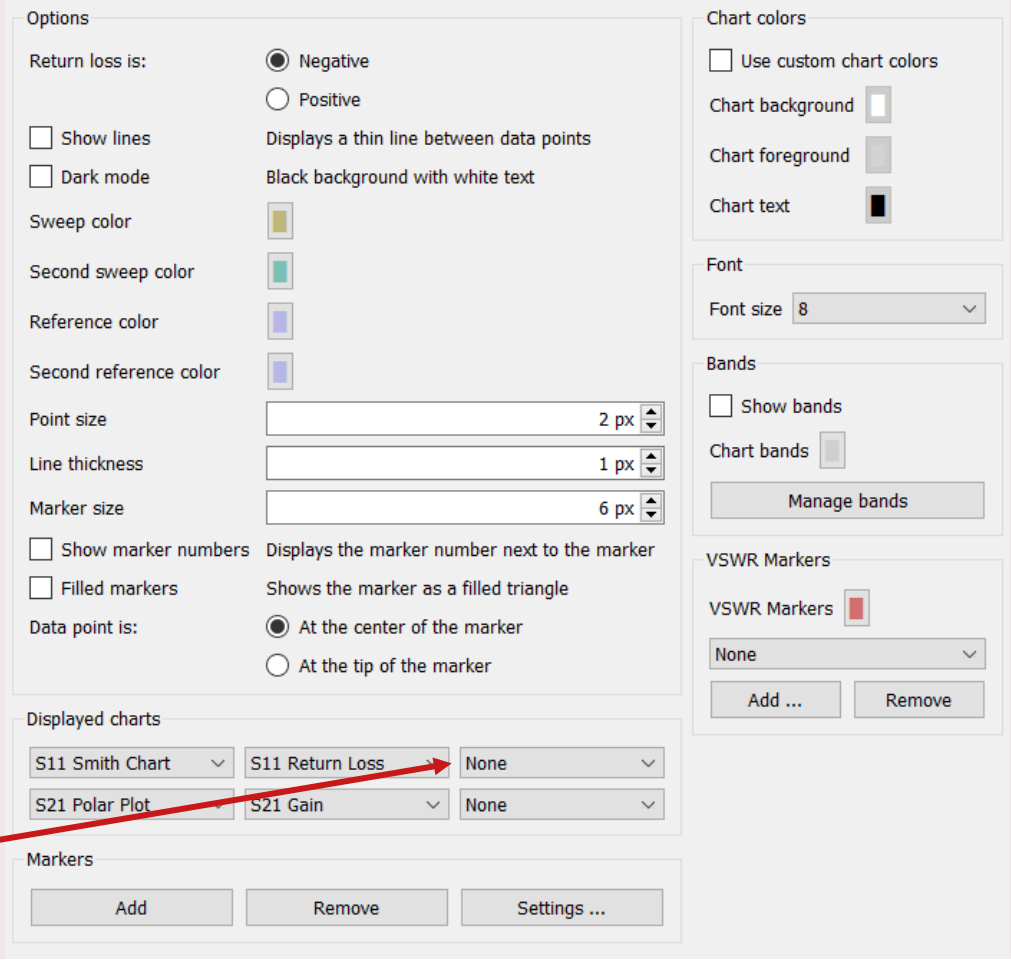
Using NanoVNASaver

How to change/add plot displays?

Default plots:
- S11 Smith
- S21 Polar
- S11 LOGMAG
- S21 LOGMAG

You can change the plots or you can add one.

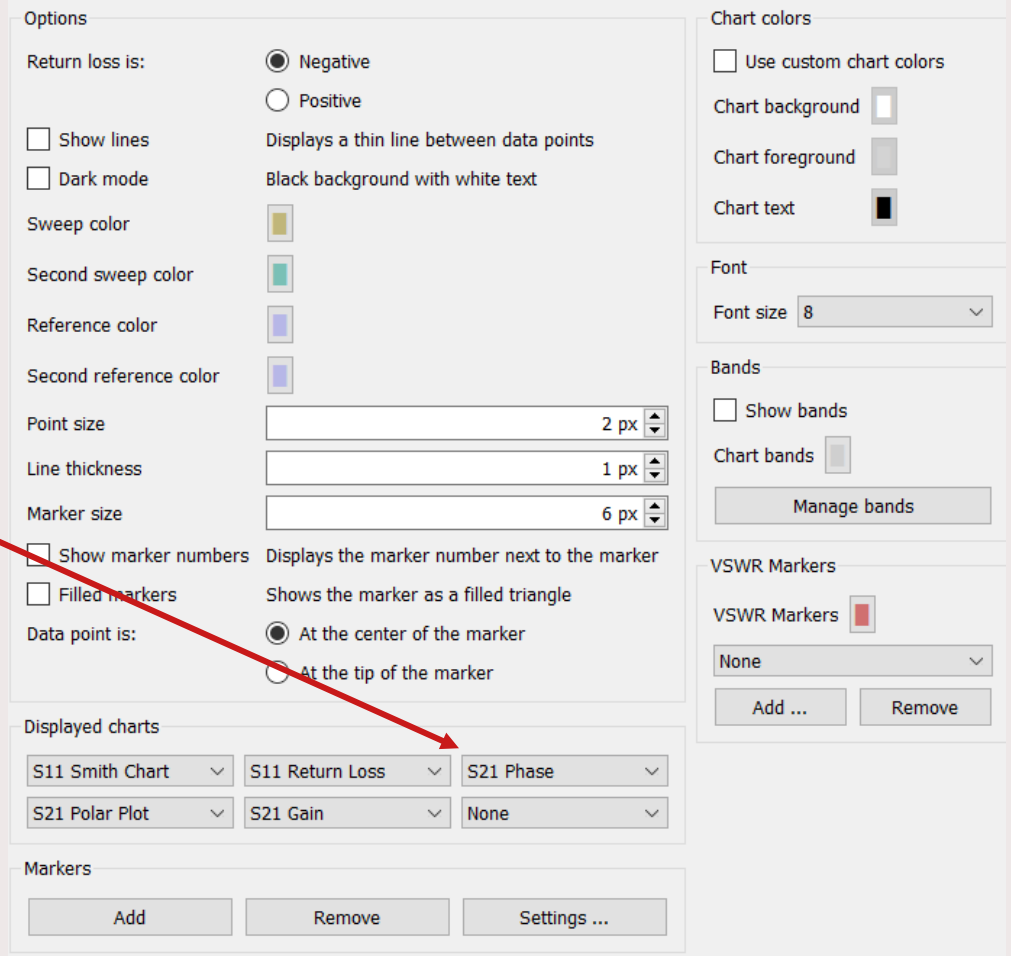
Adding a phase plot



Using NanoVNASaver

How to change the plot display?

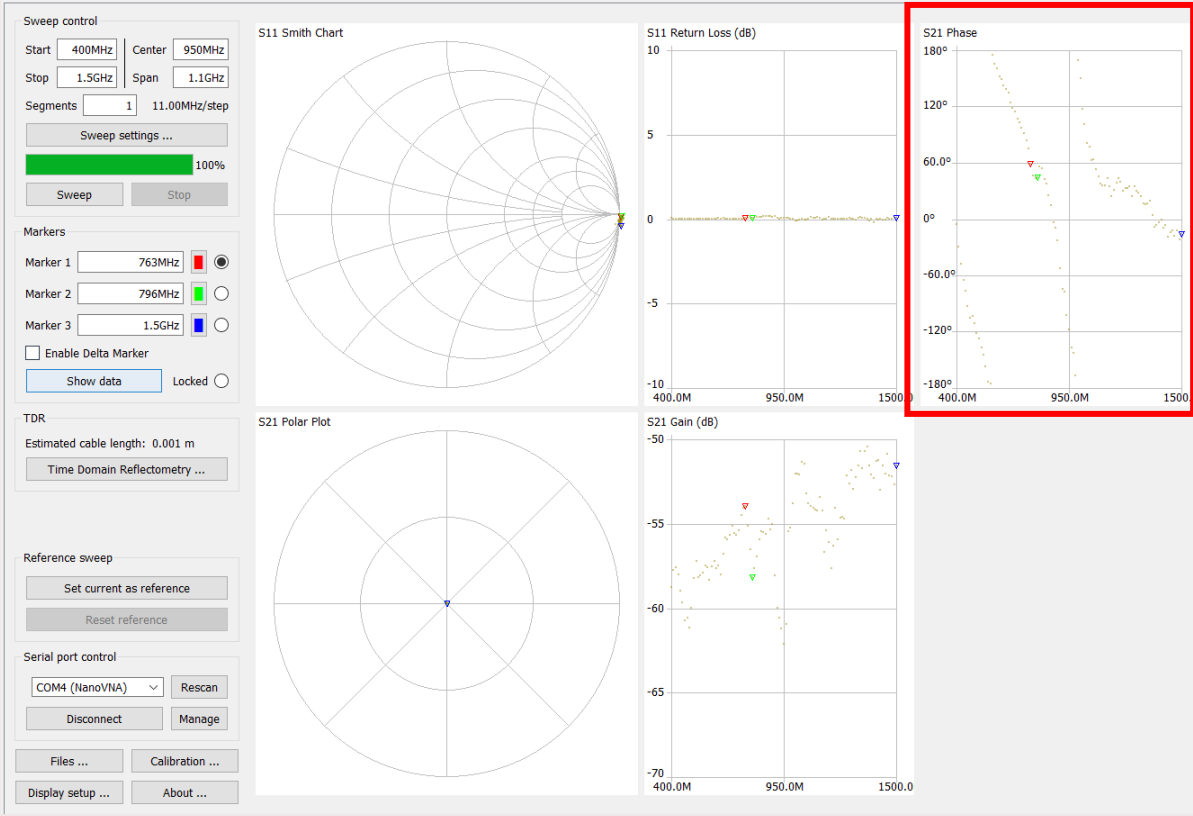
Add a S21 phase plot



Using NanoVNASaver

How to change the plot display?

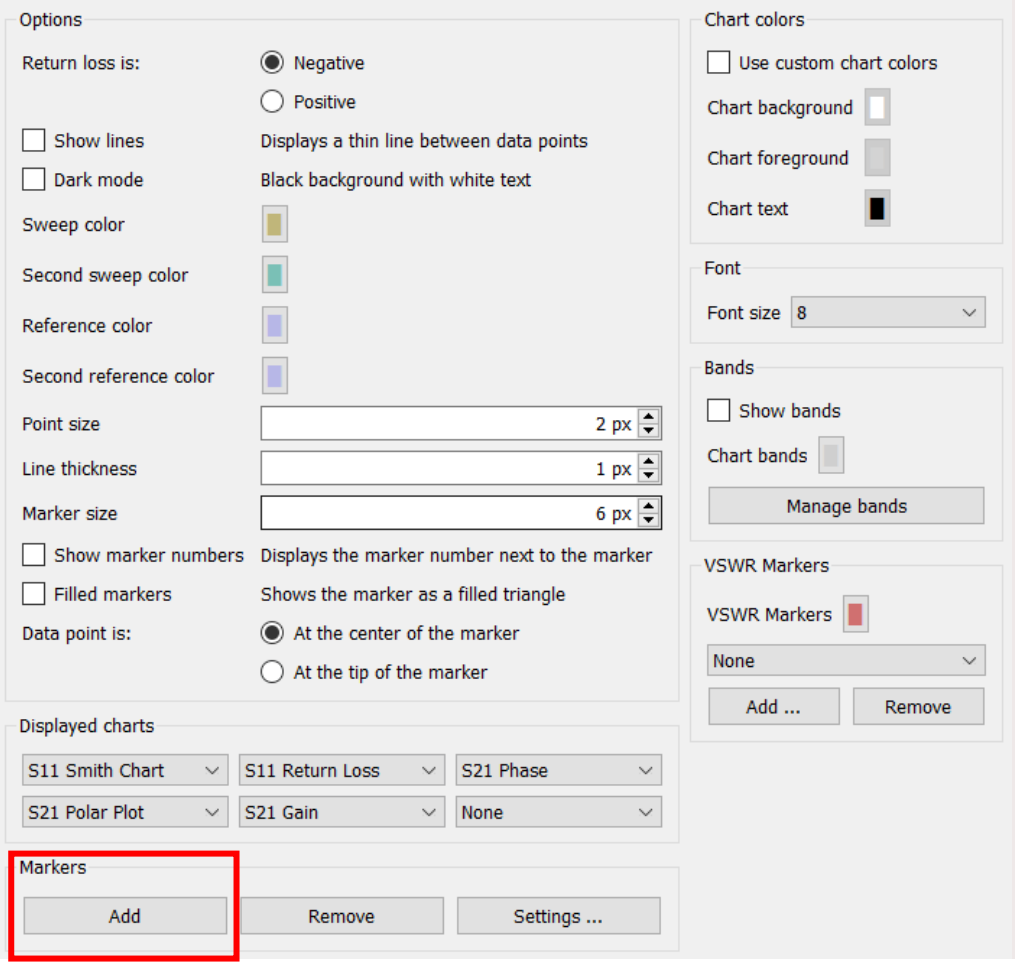
Additional window is created in the main window



Using NanoVNASaver

Changing and adding markers

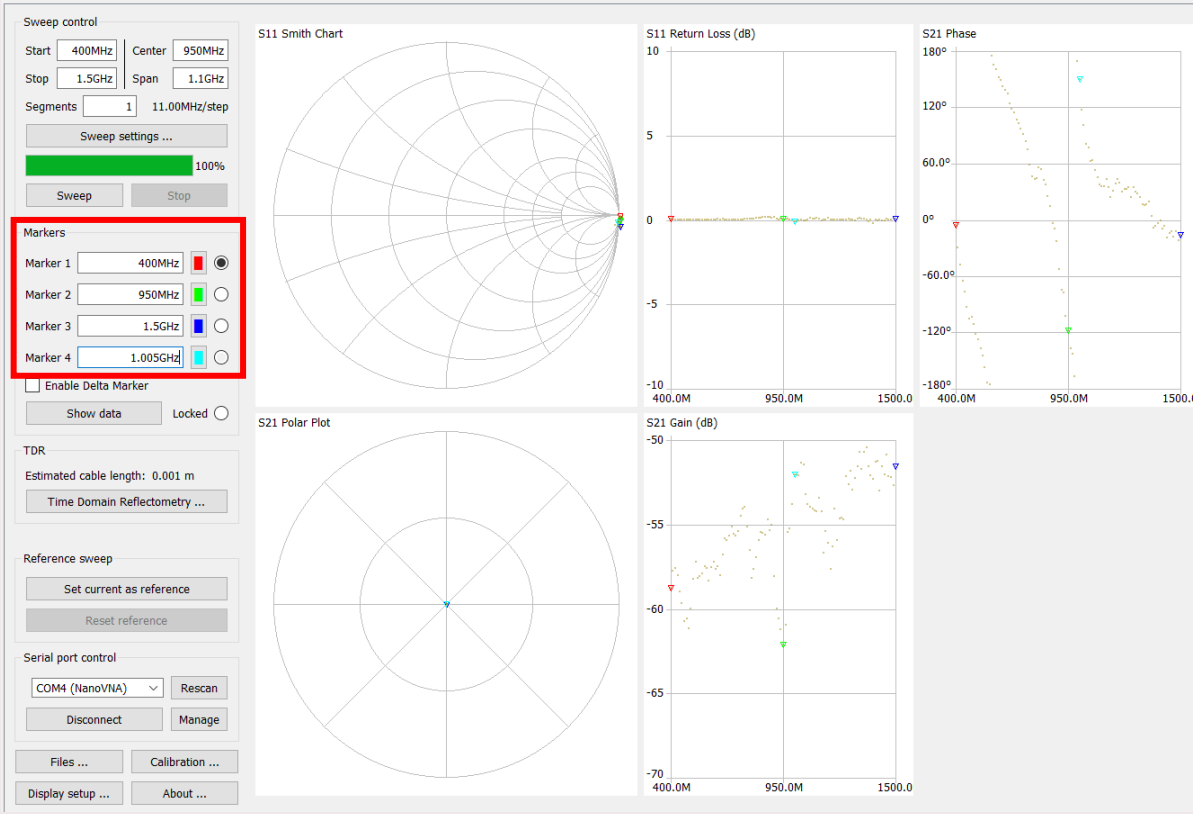
You can add a marker via *Display setup…*



Using NanoVNASaver

Changing and adding markers

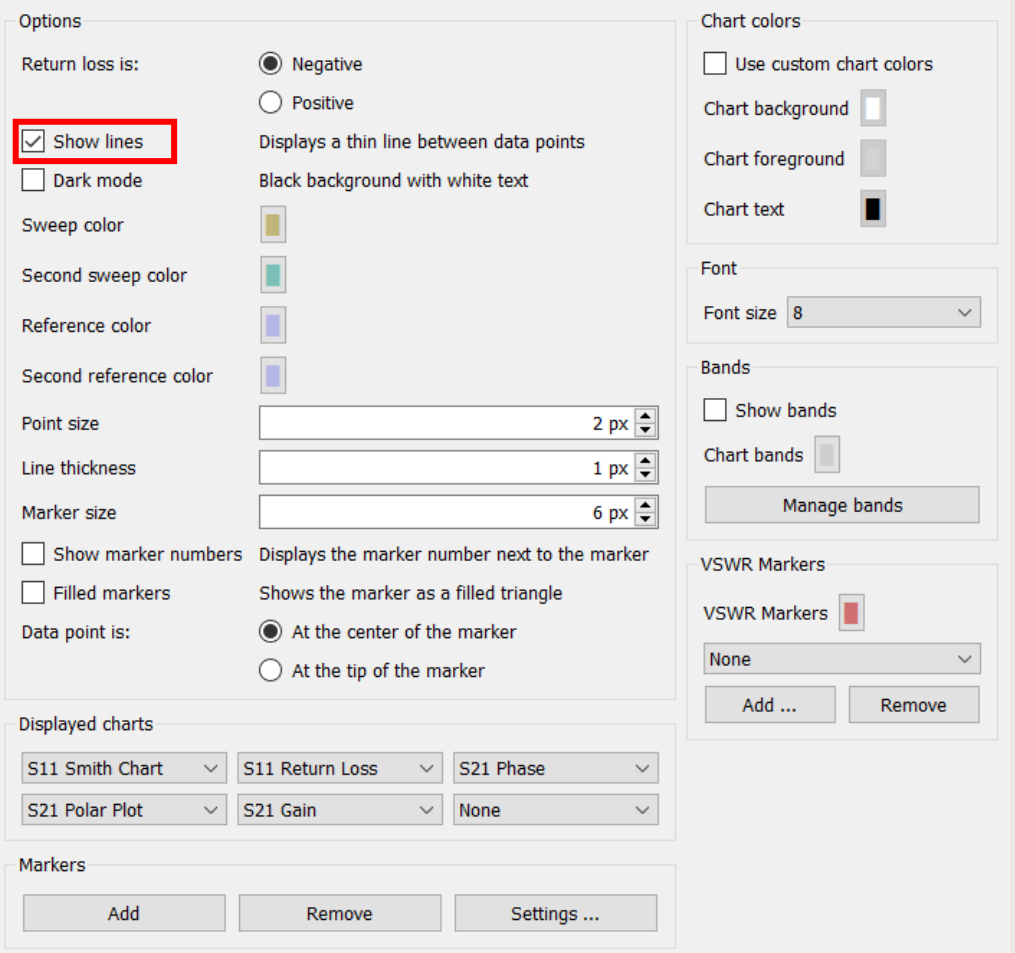
You can change the frequency of the marker by selecting and typing



Using NanoVNASaver

Using traces instead of data points only

You can add a traces via *Display setup…* → *Show lines*



Topics

- How to calibrate your NanoVNA?
- Changing your plot display
- Using NanoVNASaver
- **Common bugs when using the NanoVNA**

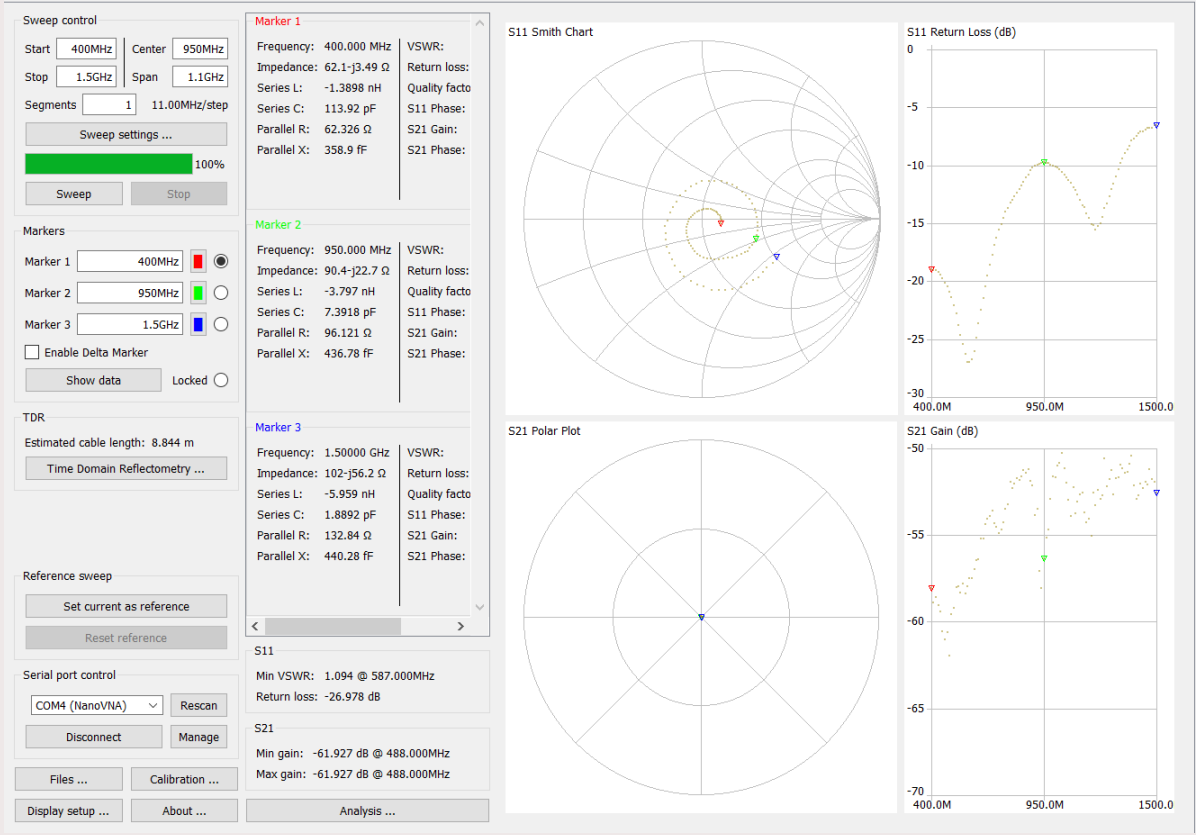
Common bugs when using the NanoVNA

Something went wrong with exporting your data to NanoVNASaver

Note: the same strange plot is probably also shown in your NanoVNA display

When you connect your device and the smith chart shows something similar to the figure on the left, then your data is probably not loaded correctly.

1. Disconnect NanoVNASaver
2. Remove the cable from the NanoVNA
3. Reconnect cable to the NanoVNA
4. Connect the NanoVNA on NanoVNASaver



Common bugs when using the NanoVNA

Resetting sweep after importing data to NanoVNASaver

When you connected your device to NanoVNASaver the NanoVNA sets its sweep on pause. You can visualize new data by resetting this.

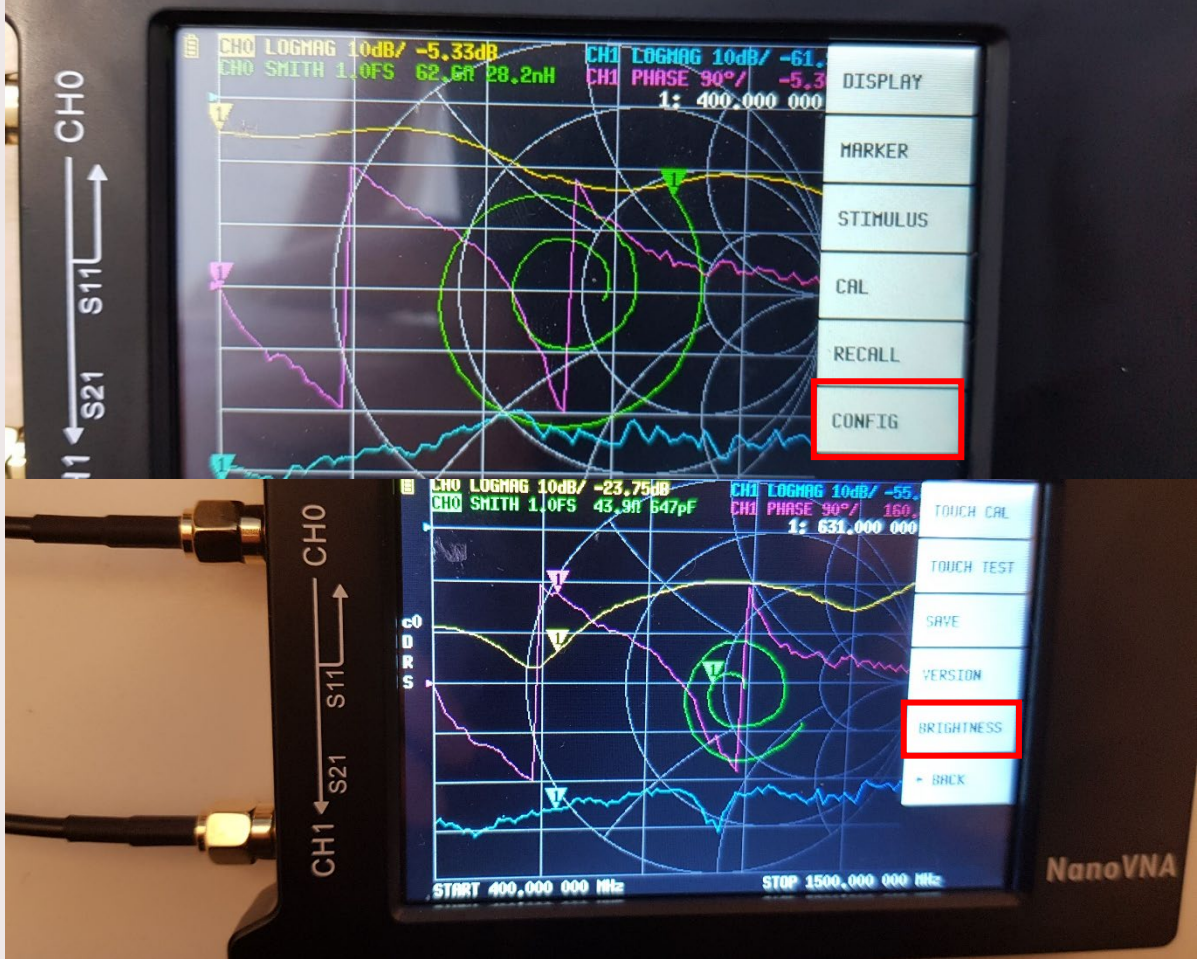
Stimulus→Pause Sweep

Common bugs when using the NanoVNA

Resetting brightness after importing data to NanoVNASaver

When you connected your device to NanoVNASaver the NanoVNA sets its sweep on pause. You can visualize new data by resetting this.

Config→Brightness→ 3300 (for maximum brightness)



Common bugs when using the NanoVNA

Data cannot be loaded into NanoVNASaver

A warning message appears which restricts you to load data into NanoVNASaver

Recalibrate your NanoVNA again!
Follow the procedure on slides 6-15

Common bugs when using the NanoVNA

No traces are visible anymore

When your NanoVNA is completely empty and no traces are visible, check if these traces are turned off. Otherwise, recalibrate your NanoVNA again!
Follow the procedure on slides 6-15